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(54) **DRIVING DEVICE AND DRIVING METHOD FOR LIQUID CRYSTAL DISPLAY**

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(30) **Foreign Application Priority Data**

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G09G 3/36 (2006.01)

(52) **U.S. Cl.**
USPC **345/99**; 345/690

(58) **Field of Classification Search**
CPC G09G 3/3677; G09G 3/3692
USPC 345/87–89, 94, 99, 690, 204
See application file for complete search history.

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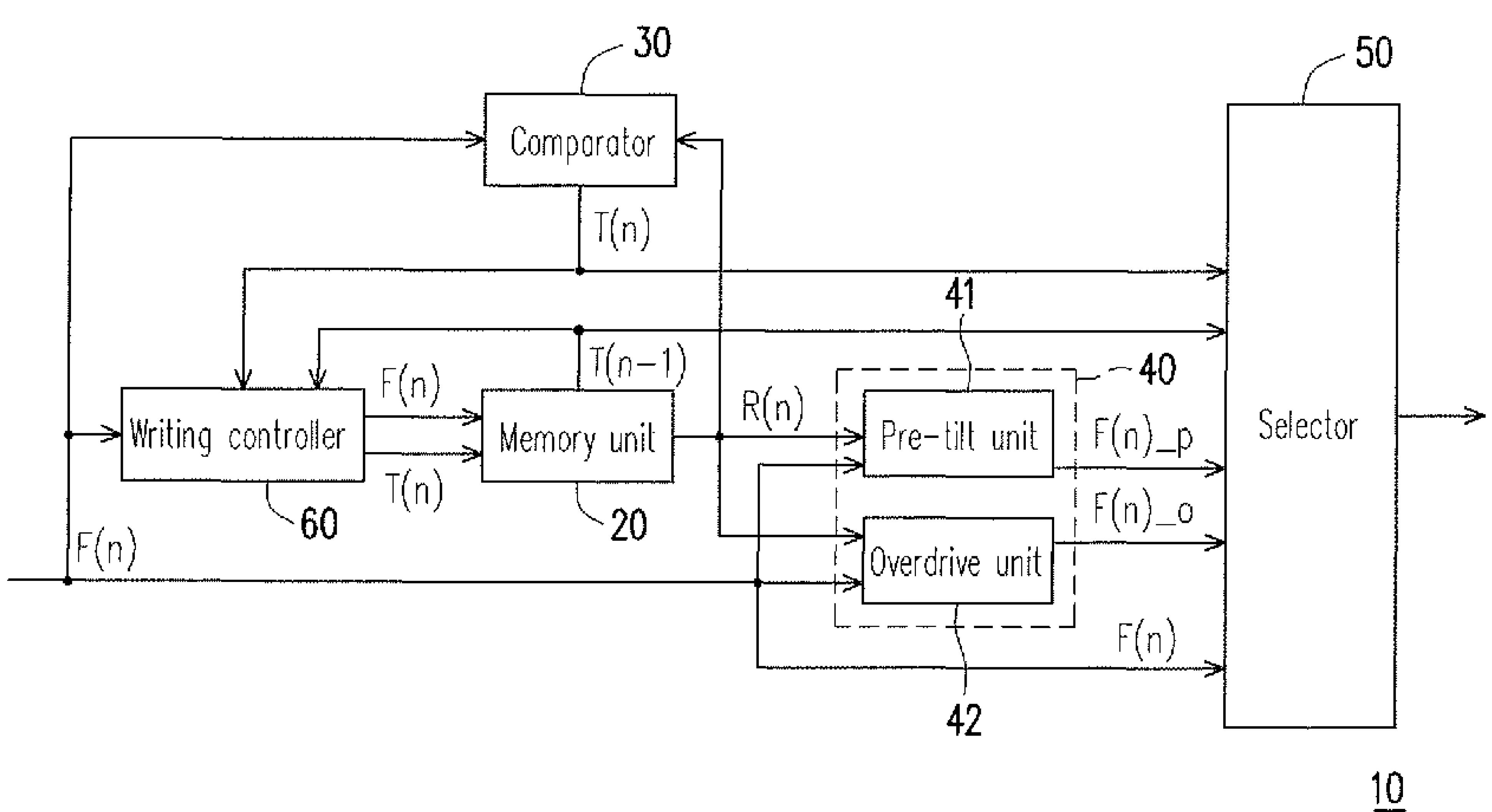
(57) **ABSTRACT**

A driving device and a driving method for a liquid crystal display are provided. The driving device includes a memory unit, a comparator, a compensation unit, and a selector. The memory unit provides a storage image and a previous comparison result. The comparator compares a present image with the storage image and outputs a present comparison result. The compensation unit processes the present image according to the storage image to generate a plurality of processed present images. The selector selects and outputs one of the present image and the processed present images according to the previous comparison result and the present comparison result. Thereby, the space required in the memory unit is reduced and the image display quality is improved.

9 Claims, 5 Drawing Sheets



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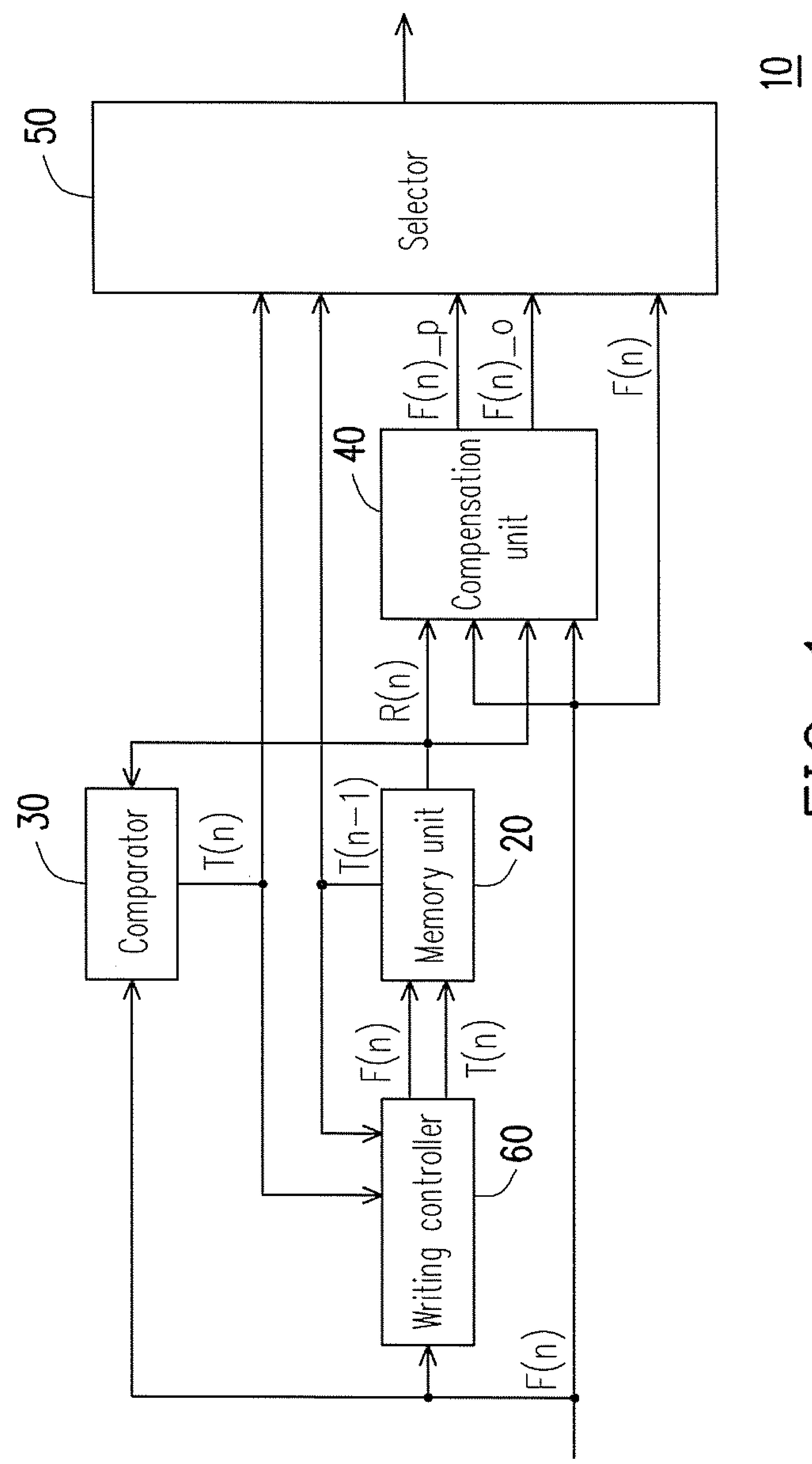
10
50
Selector
40
Compensation unit
F(n)_p
F(n)_o
F(n)
R(n)
30
Comparator
T(n)
20
Memory unit
T(n−1)
60
Writing controller
F(n)
T(n)
F(n)

FIG. 1

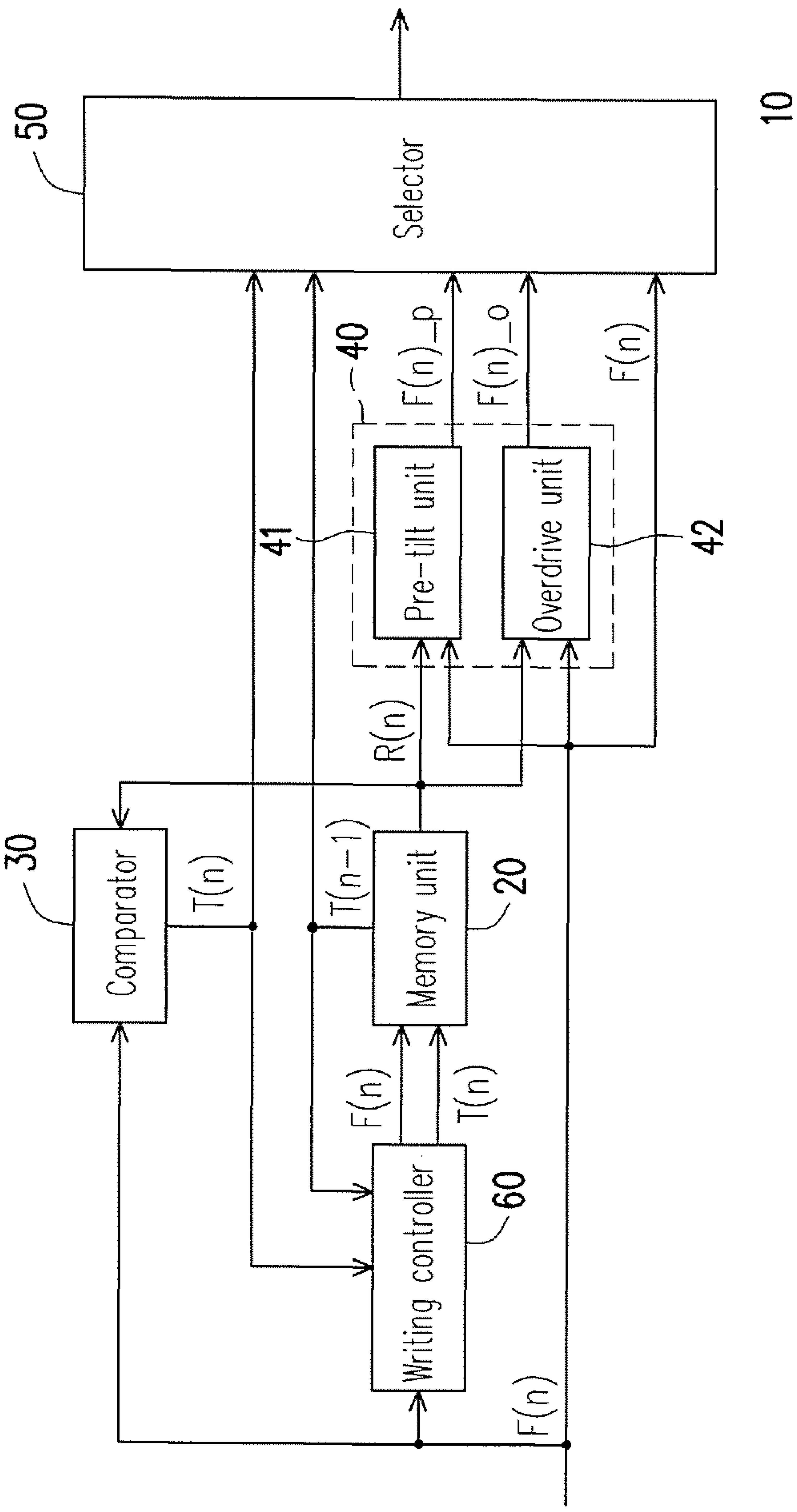
Selector
50
10
40
41
42
Pre-tilt unit
Overdrive unit
F(n)_p
F(n)_o
F(n)
R(n)
30
Comparator
T(n)
T(n-1)
Memory unit
20
F(n)
T(n)
Writing controller
60
F(n)

FIG. 2

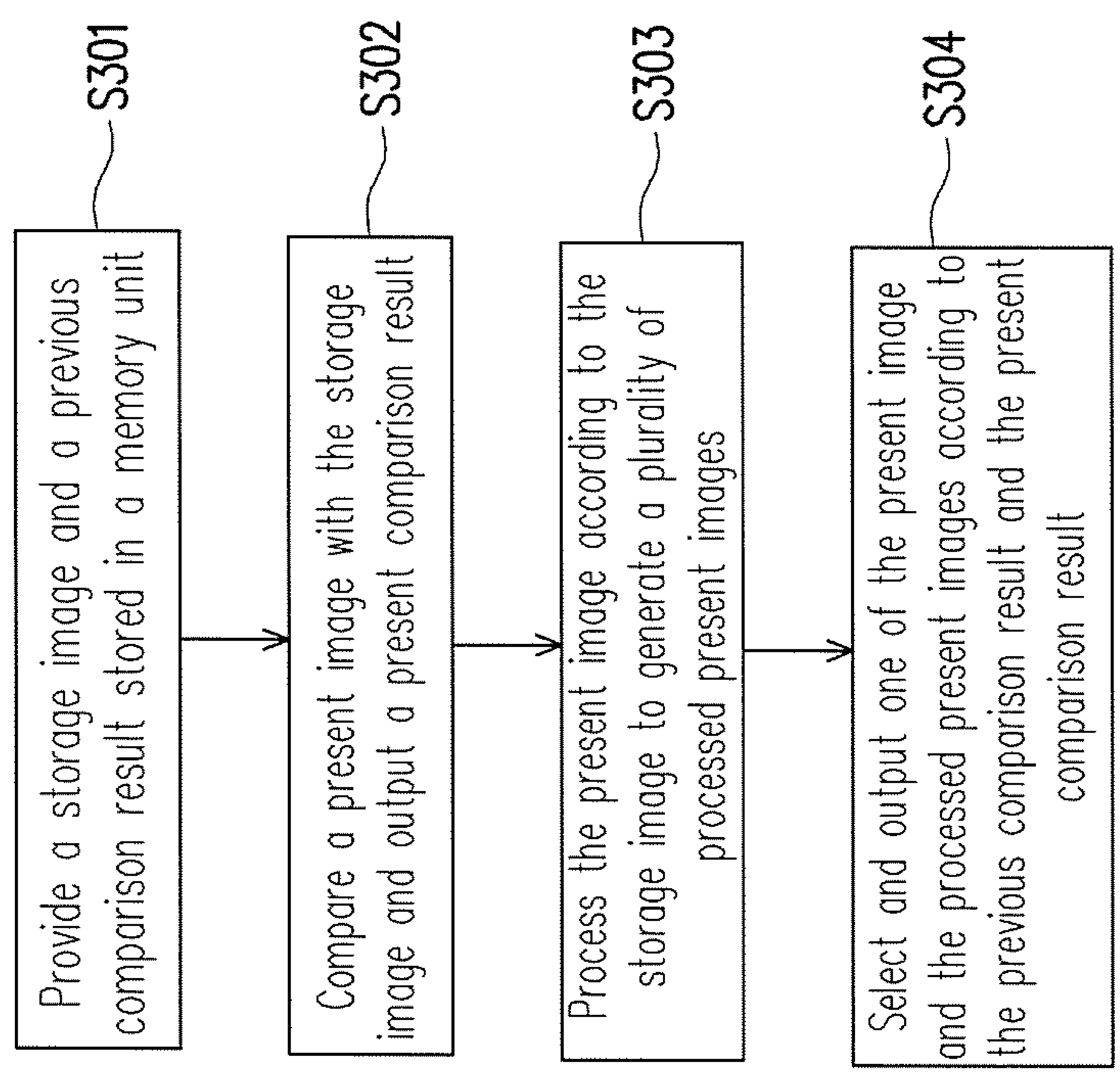
S301
Provide a storage image and a previous comparison result stored in a memory unit
S302
Compare a present image with the storage image and output a present comparison result
S303
Process the present image according to the storage image to generate a plurality of processed present images
S304
Select and output one of the present image and the processed present images according to the previous comparison result and the present comparison result

FIG. 3

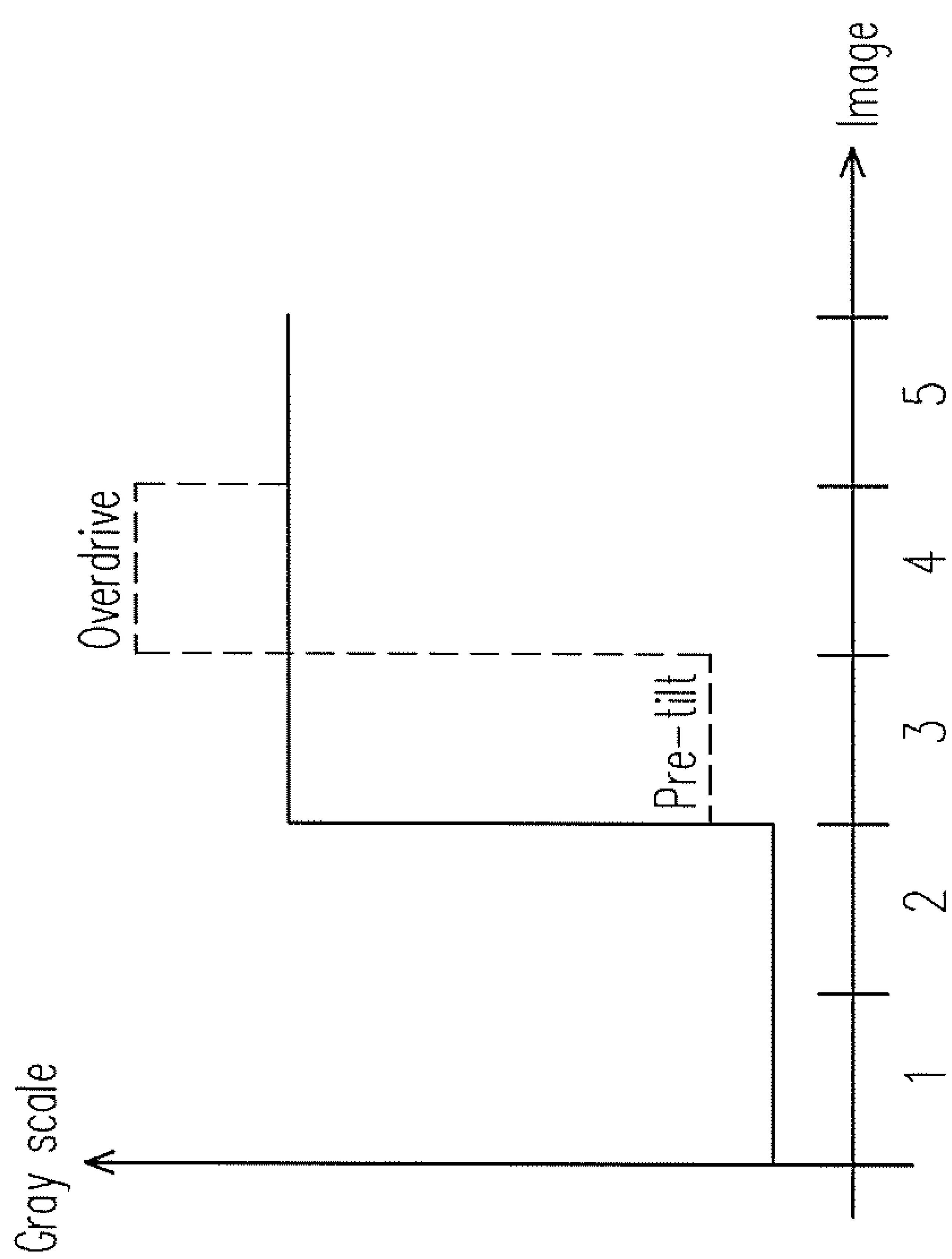

FIG. 4

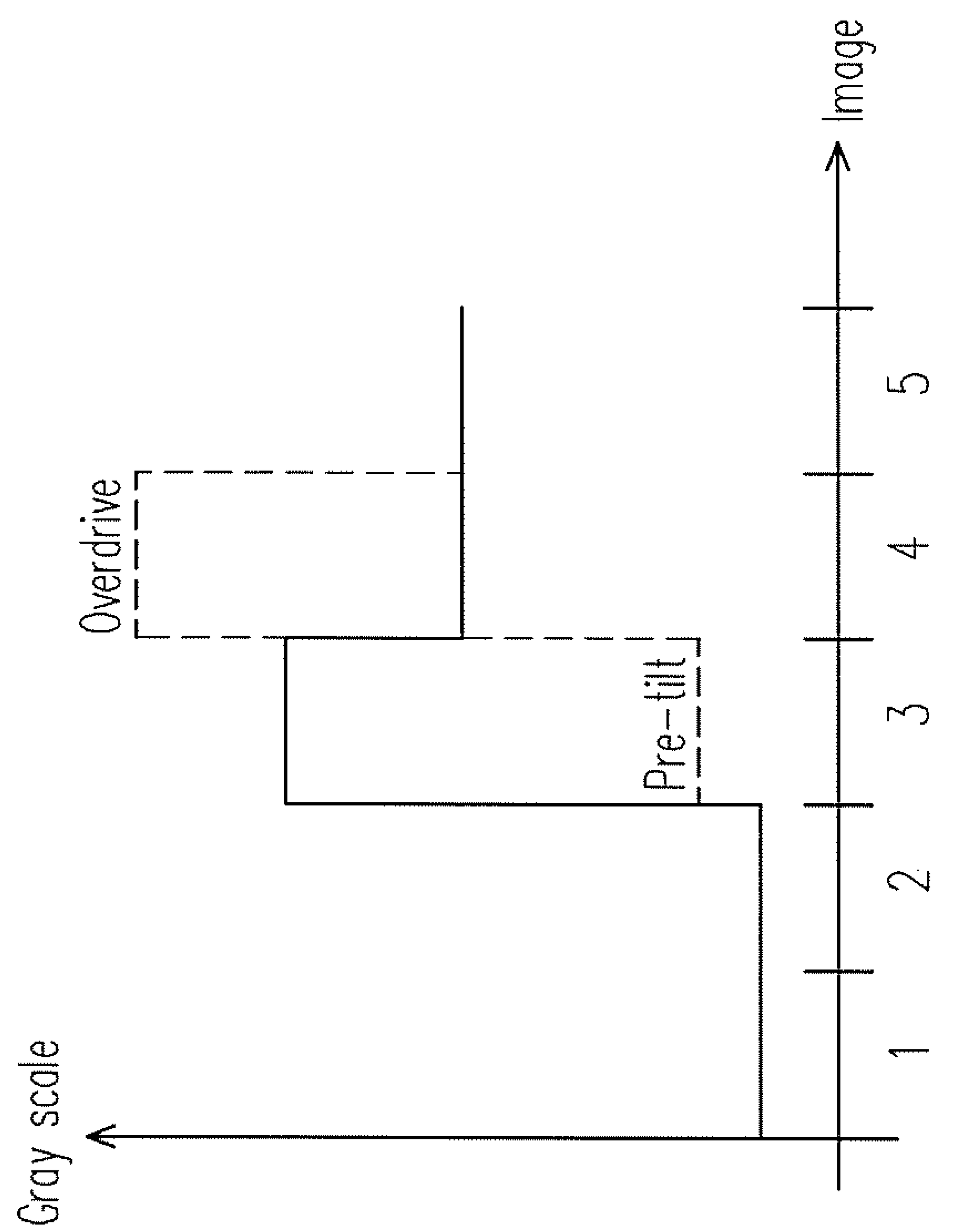

FIG. 5

DRIVING DEVICE AND DRIVING METHOD FOR LIQUID CRYSTAL DISPLAY

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of and claims the priority benefit of U.S. application Ser. No. 12/505,550, filed on Jul. 20, 2009, now pending, which claims the priority benefit of Taiwan application serial no. 98110234, filed on Mar. 27, 2009. The entirety of the above-mentioned patent application is hereby incorporated by reference herein and made a part of specification.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to a driving technique, and more particularly, to a driving technique for a liquid crystal display (LCD).

2. Description of Related Art

A liquid crystal display (LCD) has gradually replaced the conventional cathode ray tube (CRT) thanks to its small volume and low power consumption. Accordingly, LCD has been broadly applied to different devices, such as cell phones and digital billboards. However, when a dynamic image is displayed in a LCD, the slow reverse speed of the liquid crystal unit in the LCD may cause residual image and blur to be produced within the displayed image. As a result, the display quality of the dynamic image is not satisfactory.

Presently, regarding each dynamic image, the control circuit of a LCD performs an overdrive action to each liquid crystal unit in a changing state to increase the reverse speed of the liquid crystal unit. Thereby, the display quality of the dynamic image is improved and no residual image is produced.

Generally speaking, the overdrive technique is to adjust a present image according to one or more previous images. The more previous images are used, the more precisely the present image can be adjusted. However, the more previous images are adopted, the more memory units have to be used for storing these previous images. As a result, both the surface area and the fabrication cost of the chip are increased.

SUMMARY OF THE INVENTION

Accordingly, the present invention is directed to a driving device which may reduce the space required in a memory unit and improve the image display quality.

The present invention is also directed to a driving method for a liquid crystal display (LCD) which may improve the image display quality of the LCD.

The present invention provides a driving device including a memory unit, a comparator, a compensation unit, and a selector. The memory unit provides a storage image and a previous comparison result. The comparator is coupled to the memory unit, and the comparator compares a present image with the storage image and outputs a present comparison result. The compensation unit is coupled to the memory unit, and the compensation unit processes the present image according to the storage image to generate a plurality of processed present images. The selector is coupled to the compensation unit, the comparator, and the memory unit, and the selector selects and outputs one of the present image and the processed present images according to the previous comparison result and the present comparison result.

According to an embodiment of the present invention, the driving device further includes a writing controller coupled to the comparator and the memory unit. The writing controller writes the present comparison result into the memory unit to replace the previous comparison result and determines whether to write the present image into the memory unit to replace the storage image according to the previous comparison result. If the previous comparison result indicates that a previous image which is processed right before the present image is different from a previous storage image, the writing controller writes the present image into the memory unit to replace the storage image.

According to an embodiment of the present invention, the compensation unit includes a pre-tilt unit and an overdrive unit. The pre-tilt unit is coupled to the memory unit and the selector, and the pre-tilt unit pre-tilts the present image to generate a first processed present image among the processed present images. The overdrive unit is coupled to the memory unit and the selector, and the overdrive unit overdrives the present image to generate a second processed present image among the processed present images. If the present comparison result indicates that the present image is the same as the storage image, the selector outputs the present image. If the present comparison result indicates that the present image is different from the storage image and the previous comparison result indicates that the previous image is the same as the previous storage image, the selector outputs the first processed present image. If the present comparison result indicates that the present image is different from the storage image and the previous comparison result indicates that the previous image is different from the previous storage image, the selector outputs the second processed present image.

According to an embodiment of the present invention, the previous comparison result is 1 bit, and the present comparison result is 1 bit. The storage image is 7 bits, and the present image is 7 bits.

The present invention also provides a driving method for a LCD. The driving method includes following steps. A storage image and a previous comparison result stored in a memory unit are provided. Further, a present image is compared with the storage image and a present comparison result is output. In addition, the present image is processed according to the storage image to generate a plurality of processed present images. Besides, one of the present image and the processed present images is selected and output according to the previous comparison result and the present comparison result.

As described above, in the present invention, a present image is processed according to a storage image to generate a plurality of processed present images. Besides, the present image is compared with the storage image to generate a present comparison result. In addition, one of the present image and the processed present images is selected and output according to the previous comparison result and the present comparison result. Thereby, the image display quality can be improved.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings are included to provide a further understanding of the invention, and are incorporated in and constitute a part of this specification. The drawings illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention.

FIG. **1** is a block diagram of a driving device for a liquid crystal display (LCD) according to an embodiment of the present invention.

FIG. **2** is a detailed block diagram of a compensation unit in FIG. **1**.

FIG. **3** is a flowchart of a driving method according to an embodiment of the present invention.

FIG. **4** is a grayscale view of continuous images according to an embodiment of the present invention.

FIG. **5** is a grayscale view of continuous images according to another embodiment of the present invention.

DESCRIPTION OF THE EMBODIMENTS

Reference will now be made in detail to the present preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers are used in the drawings and the description to refer to the same or like parts.

In the conventional overdrive technique, the more previous images are used, the more precisely a present image can be adjusted. However, as a result, more memory units have to be adopted, which not only increases the surface area of the chip but the fabrication cost thereof.

Accordingly, in embodiments of the present invention, a plurality of images is continuously compared to generate a plurality of comparison results. Each of the comparison results only indicates whether two images are substantially the same therefore contains only a small quantity of data. Namely, only a small-quantity memory unit is used for storing these comparison results. On the other hand, different image processing could be performed to the present image to generate a plurality of processed present images. Then, one of the present image and the processed present images is selected and output according to the comparison results. Because the comparison results contain information of previous images, the quality of a displayed image is effectively improved, and the space required in the memory unit is reduced. Below, exemplary embodiments of the present invention will be described with reference to accompanying drawings.

FIG. **1** is a block diagram of a driving device for a liquid crystal display (LCD) according to an embodiment of the present invention. Referring to FIG. **1**, the driving device **10** is suitable for a LCD. The driving device **10** includes a memory unit **20**, a comparator **30**, a compensation unit **40**, and a selector **50**. Besides, the driving device **10** further includes a writing controller **60**. The memory unit **20** is coupled to the comparator **30**, the compensation unit **40**, the selector **50**, and the writing controller **60**. The comparator **30** is coupled to the selector **50** and the writing controller **60**. The compensation unit **40** is coupled to the selector **50**.

The comparator **30**, the compensation unit **40**, the selector **50**, and the writing controller **60** receive a present image F(n). In the present embodiment, it is assumed that the present image F(n) has a data quantity of 7 bits. The memory unit **20** may be a frame buffer which has two portions for respectively storing an image and a comparison result. Besides, the memory unit **20** provides a storage image R(n) to the comparator **30**, the compensation unit **40**, and the selector **50** and provides a previous comparison result T(n−1) to the selector **50**, wherein the previous comparison result T(n−1) indicates whether a previous image F(n−1) is substantially the same as a previous storage image R(n−1). It should be noted that the previous image F(n−1) is the image provided to the comparator **30**, the writing controller **60** and the compensation unit **40** right before the present image F(n), the storage image R(n) is the image stored in the memory unit **20** when the present image F(n) is processed, and the previous storage image R(n−1) is the image stored in the memory unit **20** when the previous image F(n−1) is processed.

As described above, the comparator **30** compares the present image F(n) with the storage image R(n) and generates a present comparison result T(n). For example, the comparator **30** respectively compares each pixel of the present image F(n) with each pixel of the storage image R(n). If all the pixels of the present image F(n) are the same as all the pixels of the storage image R(n), the present comparison result T(n) indicates that the present image F(n) is substantially the same as the storage image R(n). In the present embodiment, it is assumed that the present comparison result T(n) has a data quantity of 1 bit. If the present comparison result T(n) is 1, it indicates that the present image F(n) is substantially different from the storage image R(n); contrarily, if the present comparison result T(n) is 0, it indicates that the present image F(n) is substantially the same as the storage image R(n). In addition, the comparator **30** provides the present comparison result T(n) to the writing controller **60** and the selector **50**.

The writing controller **60** writes the present comparison result T(n) into the memory unit **20** to replace the previous comparison result T(n−1) in the memory unit **20**. Besides, the writing controller **60** writes the present image F(n) into the memory unit **20** to replace the storage image R(n) in the memory unit **20**. In the present embodiment, the writing controller **60** determines whether to write the present image F(n) into the memory unit **20** according to the previous comparison result T(n−1). If the previous comparison result T(n−1) indicates that the previous image F(n−1) is substantially the same as the previous storage image R(n−1), the writing controller **60** does not write the present image F(n) into the memory unit **20**.

The compensation unit **40** processes the present image F(n) according to the storage image R(n) to generate a plurality of processed present images. FIG. **2** is a detailed block diagram of the compensation unit **40** in FIG. **1**. Referring to FIG. **2**, in the present embodiment, the compensation unit **40** includes a pre-tilt unit **41** and an overdrive unit **42**. The pre-tilt unit **41** pre-tilts the present image F(n) according to the storage image R(n) to obtain a processed present image F(n)_p. To be specific, the pre-tilt unit **41** instantly generates the processed present image F(n)_p according to the storage image R(n) and the present image F(n) by using a look-up table.

Similarly, the overdrive unit **42** overdrives the present image F(n) according to the storage image R(n) to obtain a processed present image F(n)_o. To be specific, the overdrive unit **42** instantly generates the processed present image F(n)_o according to the storage image R(n) and the present image F(n) by using a look-up table.

Finally, the selector **50** selects and outputs one of the present image and the processed present images according to the previous comparison result T(n−1) and the present comparison result T(n). Below, an output pattern of the selector **50** will be provided in following table 1 to be referred by those skilled in the art.

TABLE 1

An output pattern of the selector 50

	T(n − 1) = 0	T(n − 1) = 1
T(n) = 0	Output F(n)	Output F(n)
T(n) = 1	Output F(n)_p	Output F(n)_o

For example, if the present comparison result T(n) indicates that the storage image R(n) is substantially the same as the present image F(n), the selector **50** outputs the present image F(n). If the present comparison result T(n) indicates that the storage image R(n) is substantially different from the present image F(n) and the previous comparison result T(n−1) indicates that the previous storage image R(n−1) is substantially the same as the previous image F(n−1), the selector **50** output the processed present image F(n)_p. If the present comparison result T(n) indicates that the storage image R(n) is substantially different from the present image F(n) and the previous comparison result T(n−1) indicates that the previous storage image R(n−1) is substantially different from the previous image F(n−1), the selector **50** outputs the processed present image F(n)_o. Below, a driving method for LCD provided by the present invention will be described in detail with reference to accompanying drawings.

FIG. **3** is a flowchart of a driving method according to an embodiment of the present invention. FIG. **4** is a grayscale view of continuous images according to an embodiment of the present invention. Referring to FIG. **1**, FIG. **3**, and FIG. **4**, in the present embodiment, it is assumed that the grayscales of a first image F(**1**) and a second image F(**2**) are the same, the grayscales of a third image F(**3**), a fourth image F(**4**), and a fifth image (**5**) are the same, the comparison result T(**1**) is 0, and the first image F(**1**) is stored in the memory unit **20**.

Switching from the First Image to the Second Image:

First, the second image F(**2**) is input into the comparator **30**, the writing controller **60**, the pre-tilt unit **41**, and the overdrive unit **42**. Then, in step S**301**, the memory unit **20** provides the storage image R(**2**) (previously stored first image F(**1**)) to the comparator **30**, the pre-tilt unit **41**, and the overdrive unit **42**. In addition, the memory unit **20** provides the comparison result T(**1**) (=0) to the selector **50** and the writing controller **60**. Next, in step S**302**, the comparator **30** compares the second image F(**2**) with the storage image R(**2**) (first image F(**1**)), and since the first image F(**1**) and the second image F(**2**) are substantially the same, the comparison result T(**2**) is 0. The comparator **30** outputs the comparison result T(**2**) (=0) to the writing controller **60** and the selector **50**. After that, the writing controller **60** writes the comparison result T(**2**) (=0) into the memory unit **20**. Because the comparison result T(**1**) is 0, the writing controller **60** does not write the second image F(**2**) into the memory unit **20** and the first image F(**1**) is still stored in the memory unit **20**.

On the other hand, in step S**303**, the pre-tilt unit **41** generates a pre-tilted second image F(**2**)_p according to the first image F(**1**) and the second image F(**2**) and provides the pre-tilted second image F(**2**)_p to the selector **50**. The overdrive unit **42** generates an overdriven second image F(**2**)_o according to the first image F(**1**) and the second image F(**2**) and provides the overdriven second image F(**2**)_o to the selector **50**. Next, in step S**304**, since the comparison result T(**2**) is 0, the selector **50** outputs the unprocessed second image F(**2**).

Switching from the Second Image to the Third Image:

First, the third image F(**3**) is input into the comparator **30**, the writing controller **60**, the pre-tilt unit **41**, and the overdrive unit **42**. Then, in step S**301**, the memory unit **20** provides the storage image R(**3**) (previously stored first image F(**1**)) to the comparator **30**, the pre-tilt unit **41**, and the overdrive unit **42**. In addition, the memory unit **20** provides the comparison result T(**2**) (=0) to the selector **50** and the writing controller **60**. Next, in step S**302**, the comparator **30** compares the third image F(**3**) with the storage image R(**3**) (first image F(**1**)), and since the third image F(**3**) and the first image F(**1**) are substantially different, the comparison result T(**3**) is 1. The comparator **30** outputs the comparison result T(**3**) (=1) to the writing controller **60** and the selector **50**. After that, the writing controller **60** writes the comparison result T(**3**) (=1) into the memory unit **20** to replace the previous comparison result T(**2**) (=0). Since comparison result T(**2**) is 0, the writing controller **60** does not write the third image F(**3**) into the memory unit **20** to replace the first image F(**1**) and the first image F(**1**) is still stored in the memory unit **20**.

On the other hand, in step S**303**, the pre-tilt unit **41** generates a pre-tilt third image F(**3**)_p according to the first image F(**1**) and the third image F(**3**) and provides the pre-tilt third image F(**3**)_p to the selector **50**. The overdrive unit **42** generates an overdriven third image F(**3**)_o according to the first image F(**1**) and the third image F(**3**) and provides the overdriven third image F(**3**)_o to the selector **50**. Next, in step S**304**, since the comparison result T(**2**) is 0 and the comparison result T(**3**) is 1, the selector **50** outputs the pre-tilt third image F(**3**)_p.

Switching from the Third Image to the Fourth Image:

First, the fourth image F(**4**) is input into the comparator **30**, the writing controller **60**, the pre-tilt unit **41**, and the overdrive unit **42**. Then, in step S**301**, the memory unit **20** provides the storage image R(**4**) (previously stored first image F(**1**)) to the comparator **30**, the pre-tilt unit **41**, and the overdrive unit **42**. In addition, the memory unit **20** provides the comparison result T(**3**) (=1) to the selector **50** and the writing controller **60**. Next, in step S**302**, the comparator **30** compares the fourth image F(**4**) with the storage image R(**4**) (first image F(**1**)), and since the fourth image F(**4**) and the first image F(**1**) are substantially not the same, the comparison result T(**4**) is 1. The comparator **30** outputs the comparison result T(**4**) (=1) to the writing controller **60** and the selector **50**. After that, the writing controller **60** writes the comparison result T(**4**) (=1) into the memory unit **20** to replace the previous comparison result T(**3**) (=1). Since the comparison result T(**3**) is 1, the writing controller **60** writes the fourth image F(**4**) into the memory unit **20**. Therefore, the image stored in the memory unit **20** is the fourth image F(**4**).

On the other hand, in step S**303**, the pre-tilt unit **41** generates a pre-tilt fourth image F(**4**)_p according to the first image F(**1**) and the fourth image F(**4**) and provides the pre-tilt fourth image F(**4**)_p to the selector **50**. The overdrive unit **42** generates an overdriven fourth image F(**4**)_o according to the first image F(**1**) and the fourth image F(**4**) and provides the overdriven fourth image F(**4**)_o to the selector **50**. Next, in step S**304**, since the comparison result T(**3**) is 1 and the comparison result T(**4**) is 1, the selector **50** outputs the overdriven fourth image F(**4**)_o.

Switching from the Fourth Image to the Fifth Image:

First, the fifth image F(**5**) is input into the comparator **30**, the writing controller **60**, the pre-tilt unit **41**, and the overdrive unit **42**. Then, in step S**301**, the memory unit **20** provides the storage image R(**5**) (previously stored fourth image F(**4**)) to the comparator **30**, the pre-tilt unit **41**, and the overdrive unit **42**. In addition, the memory unit **20** provides the comparison result T(**4**) (=1) to the selector **50** and the writing controller **60**. Next, in step S**302**, the comparator **30** compares the fifth image F(**5**) with the storage image R(**5**) (the fourth image F(**4**)), and since the fifth image F(**5**) and the fourth image F(**4**) are substantially the same, the comparison result T(**5**) is 0. The comparator **30** outputs the comparison result T(**5**) (=0) to the writing controller **60** and the selector **50**. After that, the writing controller **60** writes the comparison result T(**5**) (=0) into the memory unit **20** to replace the previous comparison result T(**4**) (=1). Since the comparison result T(**4**) is 1, the writing controller **60** writes the fifth image F(**5**) into the memory unit **20**. Therefore, the image stored in the memory unit **20** is the fifth image F(**5**).

On the other hand, in step S**303**, the pre-tilt unit **41** generates a pre-tilt fifth image F(**5**)_p according to the fourth image F(**4**) and the fifth image F(**5**), and provides the pre-tilt fifth image F(**5**)_p to the selector **50**. The overdrive unit **42** generates an overdriven fifth image F(**5**)_o according to the fourth image F(**4**) and the fifth image F(**5**) and provides the overdriven fifth image F(**5**)_o to the selector **50**. Next, in step S**304**, since the comparison result T(**4**) is 1 and the comparison result T(**5**) is 0, the selector **50** outputs the unprocessed fifth image F(**5**).

As described above, in the present embodiment, images are compared and comparison results are generated. Since each of these comparison results has a data quantity of only 1 bit but at the same time can keep the information of two images, not only the space required in the memory unit **20** is effectively reduced, but the response time of the liquid crystal unit is effectively shortened due to that the selector **50** can select and output the most suitable image (for example, a pre-tilt image or an overdriven image). Moreover, in the present embodiment, the selector **50** determines which image to output according to the two comparison results. The two comparison results contain information of three images, but the memory unit **20** only stores one image and one comparison result. Thus, in the present embodiment, the space required in the memory unit **20** won't be increased while the image display quality is improved.

It should be mentioned that even though a possible pattern of the driving device and the driving method for LCD in the present invention have been described in foregoing embodiment, it should be understood by those having ordinary knowledge in the art that every manufacturer has different design about the driving device and the LCD driving method. Thus, the application of the present invention is not limited to foregoing possible pattern. In other words, it is within the scope and spirit of the present invention as long as a present image is compared with a storage image to generate a present comparison result and one of the present image and a plurality of processed present images is selected and output according to a previous comparison result and the present comparison result. Below, some other embodiments of the present invention will be further described in order to allow those having ordinary knowledge in the art to fully understand the spirit of the present invention.

The present invention is not limited to the embodiment described above. FIG. **5** is a grayscale view of continuous images according to another embodiment of the present invention. Referring to FIG. **1**, FIG. **3**, and FIG. **5**, in the present embodiment, it is assumed that the grayscales of the first image and the second image are the same, the grayscales of the fourth image and the fifth image are the same, the comparison result T(**1**) is 0, and the first image F(**1**) is stored in the memory unit **20** before switching from the first image to the second image.

Referring to FIG. **3**, when it is switched from the first image F(**1**) to the second image F(**2**), the comparison result T(**2**) is 0, and accordingly the selector **50** outputs the unprocessed second image F(**2**). When it is switched from the second image F(**2**) to the third image F(**3**), the comparison result T(**3**) is 1, and accordingly the selector **50** outputs the pre-tilt third image F(**3**)_p. When it is switched from the third image F(**3**) to the fourth image F(**4**), the comparison result T(**4**) is 1, and accordingly the selector **50** outputs the overdriven fourth image F(**4**)_o. When it is switched from the fourth image F(**4**) to the fifth image F(**5**), the comparison result T(**5**) is 0, and accordingly the selector **50** outputs the unprocessed fifth image F(**5**).

Referring to FIG. **2** again, in the embodiment described above, the compensation unit **40** includes the pre-tilt unit **41** and the overdrive unit **42**. However, the present invention is not limited thereto, and the compensation unit **40** can be differently implemented by those skilled in the art according to the actual requirement. For example, in another embodiment of the present invention, the pre-tilt unit **41** is replaced by another overdrive unit. Namely, the compensation unit **40** includes a plurality of overdrive units which respectively execute different overdrive processes, and the selector **50** selects and outputs a suitable image according to a plurality of comparison results, so as to accomplish a similar function as that described in foregoing embodiment.

Moreover, in yet another embodiment of the present invention, the overdrive unit **42** is replaced by another pre-tilt unit. Namely, the compensation unit **40** includes a plurality of pre-tilt units which respectively execute different pre-tilt processes, and the selector **50** selects and outputs a suitable image according to a plurality of comparison results, so as to accomplish a similar function as that described in foregoing embodiment.

Referring to FIG. **2**, in the embodiment described above, the comparator **30** respectively compares each pixel of the present image F(n) with each pixel of the storage image R(n), so as to determine whether the present image F(n) is substantially the same as the storage image R(n). However, the present invention is not limited thereto. In another embodiment of the present invention, the comparator **30** performs corresponding sampling comparison to the present image F(n) and the storage image R(n). If all the correspondingly sampled pixels are the same, the comparator **30** determines that the present image F(n) is substantially the same as the storage image R(n), and if one or more correspondingly sampled pixels are different, the comparator **30** determines that the present image F(n) is substantially different from the storage age R(n).

Referring to FIG. **2** again, in the embodiment described above, the memory unit **20** only stores one comparison result and provides a previous comparison result T(n−1) to the selector **50**. However, the present invention is not limited. The memory unit **20** may also be differently implemented by those skilled in the art according to the actual requirement. For example, in another embodiment of the present invention, the memory unit **20** stores multiple comparison results and provides multiple previous comparison results (for example, the previous comparison results T(n−1) and T(n−2) to the selector **50**). It should be mentioned that the compensation unit **40** may also be disposed with up to 7 image processing devices according to the implementation of the memory unit **20** and outputs the processed images to the selector **50**. Accordingly, the selector **50** can select and output a suitable image from 8 different possibilities according to the present comparison result T(n) and the previous comparison results T(n−1) and T(n−2).

Similarly, in the embodiment described above, the memory unit **20** stores only one storage image R(n). However, the present invention is not limited thereto. In other embodiments of the present invention, the memory unit **20** may also store multiple storage images, including the previous storage image R(n−1). Accordingly, the image display quality can be further improved.

Referring to FIG. **2** again, in the embodiment described above, the present image F(n) and the storage image R(n) respectively have a data quantity of 7 bits. However, the present invention is not limited thereto, and the data quantity of the present image F(n) and the storage image R(n) can be determined by those skilled in the art according to the actual requirement. For example, in other embodiments of the present invention, the data quantity of the present image F(n) and the storage image R(n) may also be other numbers of bits, such as 15 bits. Similarly, the data quantity of the present comparison result T(n) and the previous comparison result T(n−1) is not limited to 1 bit.

As described above, in the present invention, a present image is compared with a storage image and accordingly a present comparison result is generated. In addition, one of the present image and a plurality of processed present images is selected and output according to a previous comparison result and the present comparison result. Thereby, the image display quality is improved. Moreover, the embodiments of the present invention further has following advantages:

1 A comparison result containing information of two images takes up a space of only 1 bit in a memory unit so that the space taken in the memory unit can be effectively reduced.

2. A memory unit can store multiple storage images and multiple previous comparison results so that the image display quality can be further improved.

3. A compensation unit can execute many different image processing and provide a plurality of processed images to be selected and output by a selector. Accordingly, the image display quality can be further improved.

4. Various image processing units in a compensation unit can process image simultaneously so that the problem of image delay caused long image processing time can be avoided.

5. An overdrive unit and a pre-tilt unit can effectively shorten the response time of a liquid crystal unit so that the motion blur problem in LCD can be resolved.

6. A compensation unit can speed up image processing by adopting a look-up table.

It will be apparent to those skilled in the art that various modifications and variations can be made to the structure of the present invention without departing from the scope or spirit of the invention. In view of the foregoing, it is intended that the present invention cover modifications and variations of this invention provided they fall within the scope of the following claims and their equivalents.

What is claimed is:

1. A driving device, comprising:

a memory unit, for providing a storage image and a previous comparison result;

a comparator, coupled to the memory unit, for comparing a present image with the storage image and outputs a present comparison result;

a compensation unit, coupled to the memory unit, for processing the present image according to the storage image to generate a plurality of processed present images;

a selector, coupled to the compensation unit, the comparator, and the memory unit, for selecting and outputting one of the present image and the processed present images according to the previous comparison result and the present comparison result; and

a writing controller, coupled to the comparator and the memory unit, for writing the present comparison result into the memory unit to replace the previous comparison result, and determining whether to write the present image into the memory unit to replace the storage image according to the previous comparison result, wherein the previous comparison result is a comparison result between a previous image and a previous storage image,

wherein the compensation unit further comprising:

a pre-tilt unit, coupled to the memory unit and the selector, for pre-tilting the present image to generate a first processed present image among the processed present images; and

an overdrive unit, coupled to the memory unit and the selector, for overdriving the present image to generate a second processed present image among the processed present images.

2. The driving device according to claim **1**, wherein if the previous comparison result indicates that the previous image is different from the previous storage image, the writing controller writes the present image into the memory unit to replace the storage image.

3. The driving device according to claim **1**, wherein if the present comparison result indicates that the present image is the same as the storage image, the selector outputs the present image; if the present comparison result indicates that the present image is different from the storage image and the previous comparison result indicates that a previous image is the same as a previous storage image, the selector outputs the first processed present image; and if the present comparison result indicates that the present image is different from the storage image and the previous comparison result indicates that the previous image is different from the previous storage image, the selector outputs the second processed present image.

4. The driving device according to claim **1**, wherein the previous comparison result is 1 bit, and the present comparison result is 1 bit.

5. The driving device according to claim **1**, wherein the storage image is 7 bits, and the present image is 7 bits.

6. A driving method for a liquid crystal display (LCD), comprising:

providing a storage image and a previous comparison result stored in a memory unit;

comparing a present image with the storage image and outputting a present comparison result;

processing the present image according to the storage image to generate a plurality of processed present images;

selecting and outputting one of the present image and the processed present images according to the previous comparison result and the present comparison result,

writing the present comparison result into the memory unit to replace the previous comparison result; and

if the previous comparison result indicates that a previous image is different from a previous storage image, writing the present image into the memory unit to replace the storage image,

wherein the step of processing the present image according to the storage image to generate a plurality of processed present images comprising:

pre-tilting the present image to generate a first processed present image among the processed present images; and

overdriving the present image to generate a second processed present image among the processed present images.

7. The driving method according to claim **6**, wherein the step of selecting one of the present image and the processed present images according to the previous comparison result and the present comparison result comprises:

if the present comparison result indicates that the present image is the same as the storage image, outputting the present image;

if the present comparison result indicates that the present image is different from the storage image and the previous comparison result indicates that the previous image is the same as the previous storage image, outputting the first processed present image; and

if the present comparison result indicates that the present image is different from the storage image and the previous comparison result indicates that the previous image is different from the previous storage image, outputting the second processed present image.

8. The driving method according to claim **6**, wherein the previous comparison result is 1 bit, and the present comparison result is 1 bit.

9. The driving method according to claim **6**, wherein the storage image is 7 bits, and the present image is 7 bits.

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